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Towards sustainable blue energy production: an analysis of legal transformative and adaptive capacity

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The achievement of a radical global reduction of greenhouse gases requires a legal-institutional setting capable of facilitating such a transition on a wide range of renewable technologies. This paper identifies and critically evaluates the key institutional, procedural and substantive legal mechanisms facilitating or preventing sustainable production of blue renewable energy with Finland as a case study country. The focus is on offshore wind power and hydropower. While we approach energy transition from the perspective of an EU member state, we simultaneously shed light on the relevant parts of the EU legal framework that significantly affect national legal frameworks.

Keywords: energy transition; renewable energy; blue growth; EU environmental policy; transformative law; adaptive law

1. Introduction

Current climate change mitigation goals present humanity with an unprecedented challenge. Radical global reductions in fossil fuel production and consumption are needed before 2050 in order to reach the goals set in the Paris Agreement, and there are no signs yet that this is taking place to the extent needed.[1] The EU countries have raced to establish targets for carbon neutrality, with Finland leading the pack by aiming to be carbon neutral by 2035.[2] The achievement of ambitious climate mitigation targets requires a legal-institutional setting capable of facilitating such a transition on a wide range of renewable technologies. Such a setting must also enable trade-offs between climate mitigation and declining biodiversity, as well as offer a predictable and stable operating environment for renewable energy production.

This paper aims to identify and critically evaluate the key institutional, procedural and substantive legal mechanisms facilitating or preventing sustainable production of

1 Climate Transparency, 'Climate Transparency Report Comparing G20 Climate Action and Responses to the Covid-19' (2020) www.climate-transparency.org/wp-content/uploads/2020/11/Climate-Transparency-Report-2020.pdf accessed 15 December 2020.

2 Prime Minister Sanna Marin's Government, 'Programme of Prime Minister Sanna Marin's Government 10 December 2019: Inclusive and Competent Finland – A Socially, Economically and Ecologically Sustainable Society' (Governmental Programme 2019–2023 of the Finnish Government, Publications of the Finnish Government 2019:33 2019).

blue renewable energy, with Finland as a case study country. The focus is on the two most relevant aquatic renewable technologies in Finland ('blue renewables'), namely bottom-fixed offshore wind power generation and hydropower.[3] These technologies are important for achieving carbon neutrality, but they are also part of the EU's 'sustainable blue growth' agenda.[4] Because the definition of blue growth[5] is contested, we use the more neutral concept of a 'sustainable blue economy', the core idea of which is to draw economic benefit from marine and freshwater environments without sacrificing their ecological resilience.[6] While we approach energy transition from the perspective of an EU member state (Finland), we simultaneously shed light on the relevant parts of the EU legal framework that significantly affect the composition of national legal frameworks in the member states.

The climate change mitigation benefits of blue renewables notwithstanding, offshore wind power and hydropower generation have drawn criticism due to their biodiversity and other environmental trade-offs.[7] Considering these criticisms, sustainability in the context of blue renewable energy production means carbon neutrality, but also that production is informed by the resilience of aquatic ecosystems and geared towards decoupling economic development and environmental degradation, such as biodiversity loss. This is no easy task, as energy systems producing and distributing electricity, as well as the aquatic ecosystems in which they operate, are complex, and there is uncertainty as to their future development.[8]

In light of ambitious climate change mitigation targets, legal systems regulating the production of blue renewables require *transformative capacity* for pushing the energy system to change towards carbon neutrality and adopting production technologies that cater for the set climate goals. Moreover, the legal systems require *adaptive capacity* to shift the management strategy of energy production if trade-offs for other societally and legally established goals, such as biodiversity, start mounting up. We draw

3 Blue renewables cover a wider range of technologies, such as ocean energy (wave and tidal), algal biofuels, ocean thermal energy conversion and floating photovoltaic installations. EU Commission, 'An EU Strategy to Harness the Potential of Offshore Renewable Energy for a Climate Neutral Future' (Communication), COM(2020) 741 Final. Many of these emerging technologies are not, however, fully matured to hit the markets, or feasible in the context of the Baltic Sea being a semi-closed water body. Finnish wave power companies are, however, developing their technologies outside the Baltic Sea. See AW-energy Ltd https://aw-energy.com/; Wello Ltd https://wello.eu/.

4 In fact, offshore wind energy is the fastest growing sector in the blue economy. See EU Commission, 'Report on the Blue Growth Strategy Towards More Sustainable Growth and Jobs in the Blue Economy' (Commission Staff Working Document) SWD (2017) 128 Final. See also, on the potential of offshore windpower generation, Anna Granskog and others, 'Cost-Efficient Emission Reduction Pathway to 2030 for Finland – Opportunities in Electrification and beyond' (Publication Number 140, 2nd edn, The Finnish Innovation Fund Sitra 2018).

5 See, on the criticism of blue growth, Wiebren J Boonstra, Matilda Valman, and Emma Björkvik, 'A Sea of Many Colours – How Relevant Is Blue Growth for Capture Fisheries in the Global North, and Vice Versa?' (2018) 87 Marine Policy 340.

6 The EU Commission has long used both the terms 'blue economy' and 'blue growth'. EU Commission, 'Blue Growth Opportunities for Marine and Maritime Sustainable Growth' (Communication) COM (2012) 494 Final.

7 On hydropower, see C Vörösmarty and others, 'Humans Transforming the Global Water System' (2004) 85 Eos 509; R Saidur and others, 'Environmental Impact of Wind Energy' (2011) 15(5) Renewable and Sustainable Energy Reviews 2423.

8 Marten Scheffer and others, 'Anticipating Critical Transitions' (2012) 388 Science 347; Edward J. Oughton, Will Usher, Peter Tyler, Jim W. Hall, "Infrastructure as a Complex Adaptive System", Complexity, vol. 2018, Article ID 3427826, 11 pages, 2018. https://doi.org/10.1155/2018/3427826

lessons from sustainability transitions and transformations literature as well as adaptive governance literature to establish the transformative and adaptive capacities as two key perspectives for analysing existing legal frameworks regulating offshore wind power and hydropower to integrate climate and biodiversity goals. To put it briefly, if law lacks transformative capacity, climate mitigation goals are unlikely to be met in the current tight timeframe (2050/2035). On the other hand, if law lacks adaptive capacity, efforts to achieve carbon neutrality may bring significant ecological (eg biodiversity) trade-offs with negligible climate mitigation benefit. Without the possibility to downscale technologies causing significant trade-offs in light of new knowledge and changes in social, ecological and technological circumstances and scientific knowledge thereof, the legal system risks supporting one goal (climate mitigation) while overlooking others.

There are several reasons why Finland makes an interesting case for analysing the transformative and adaptive capacity of law. First, although the transition to renewable energy is a global matter and can be discussed at a general level without a link to any country-specific regulation, a targeted analysis is urgently needed to complement broader – and more abstract – global discussions. The devil is often in the details. Second, Finland has established a globally exceptional target of becoming carbon neutral by 2035. This will require a significant and quick increase in renewable energy, and arguably a strong legal push. Finland has the highest potential for offshore wind power generation around the Baltic Sea, even with important bird areas and other nature conservation interests excluded.[9] The Finnish coastline is largely shallow enough for bottom-fixed offshore wind turbines.[10] As investments in offshore wind power generation have yet to take off, it is worth studying whether the legal framework has enough transformative capacity to push for increasing investments. Third, Finland currently has extensive hydropower generation capacity, which has gradually come to be understood to cause significant biodiversity trade-offs. Consequently, there is a need to evaluate whether and to what extent the Finnish legal framework allows state authorities to adapt existing hydropower plants and licenses regardless of their climate benefit to new environmental requirements.[11]

Methodologically, the article is based on legal doctrinal analysis and a review of theoretical and practical literature. When preparing the paper, we held discussions with a number of experts to gather background information, but only two of the discussions are referred to in this paper. The transformative and adaptive capacities of the law form two distinct, theoretically robust perspectives to doctrinal research.

The article is structured as follows. After the introduction, it discusses the role of law in societal transformation in general and in the context of transitioning to blue renewables and adapting their generation to environmental requirements. Thereafter, it describes the social-ecological context of offshore wind power and hydropower generation to give the reader necessary information on these technologies in the Finnish

9 Ari Sundelin and Jouko Putkonen, *Strateginen selvitys Suomen merituulivoimaliiketoiminnan kehittämiseksi* (Prizztech Oy 2013) 20.

10 Juho Lappalainen, 'Economic Potential of Offshore Wind Energy in the Gulf of Bothnia' (MSc Tech thesis, Aalto University School of Electrical Engineering 2019) https://aaltodoc.aalto.fi/handle/123456789/37174 accessed 15 December 2020.

11 Niko Soininen and others, 'Bringing Back Ecological Flows: Migratory Fish, Hydropower and Legal Maladaptivity in the Governance of Finnish Rivers' (2018) 44 Water International 321.

context. This contextualisation is followed by a doctrinal analysis of the EU and Finnish legal frameworks with the aim of assessing, first, the transformative legal capacity to scale up offshore wind power generation to meet ambitious climate mitigation targets without excessive trade-offs between the upscaling and biodiversity and, second, the legal adaptive capacity to downscale hydropower generation where there is a mismatch between (insignificant) climate benefit and (significant) biodiversity harm. The article does not seek to forecast future development but analyses legal factors that are likely to affect transformation in the wind power sector and adaptation in the hydropower sector.

2. Transformative and adaptive capacities of law

Without a fundamental change in global production and consumption chains, climate and environmental change will dramatically alter living conditions on the Earth. This calls for a fundamental rethinking of the energy system, which is a major source of greenhouse gases.[12] Such systemic change is driven by complex societal, economic, cultural, technological and ecological processes and cannot be directly and completely acted upon through legislation – or any other policy instrument, for that matter.[13] The transition of the energy system calls for complex interactions at and between multiple levels, dubbed landscape, regime and niche levels in the transition literature.[14] Due to numerous path dependencies, the transition is unlikely to emerge without triggering public policies and facilitative legal regulation.[15] While the institutional, procedural and substantive makeup of the law cannot alone determine the speed and direction of such a transition, it can significantly affect its trajectories. The governance of energy production[16] in general, or electricity generation in particular, is unlikely to shift quickly onto a carbon-free path without legal push and facilitation.

There is little literature on the role of law in socio-economic systems under transition. One of the few studies on the subject is an article by Grit Ludwig.[17] She discusses the role of law in transitioning to timber construction in Germany. Based on the literature on transformative environmental policy, she divides transition[18] into three phases and notes that the role of law varies depending on the phase of the

12 Intergovernmental Panel on Climate Change, *Climate Change 2014: Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*' (Ottmar Edenhofer and others (eds), Cambridge University Press 2014).

13 Paula Kivimaa and Florian Kern, 'Creative Destruction or Mere Niche Support? Innovation Policy Mixes for Sustainability Transitions' (2016) 45(1) Research Policy 205; GPJ Dijkema, Z Lukszo, and MPC Weijnen, 'Chapter 1 Introduction' in KH Dam and others (eds), *Agent-Based Modelling of Socio-Technical Systems* (Springer 2013) 4.

14 Frank W Geels, 'From Sectoral Systems of Innovation to Socio-Technical Systems Insights about Dynamics and Change from Sociology and Institutional Theory' (2004) 33 Research Policy 897.

15 Brian C Chaffin and others, 'Transformative Environmental Governance, Annual Review of Environment and Resources' (2016) 41(1) Annual Review of Environment and Resources 399, 400.

16 Governance can be understood as 'the ways and means employed by society to make collective decisions, choose collective goals, and take action to achieve those goals' (*ibid* 401), whereas law establishes the structure, authority, and process for the governmental aspect of governance. BA Cosens and others, 'The Role of Law in Adaptive Governance' (2017) 22(1) Ecology and Society 30.

17 Grit Ludwig, 'The Role of Law in Transformative Environmental Policies – A Case Study of "Timber in Buildings Construction in Germany"' (2019) 11(3) Sustainability 1.

18 Ludwig uses the term 'transformation'. However, to preserve the consistency of terminology in this paper, we systematically use 'transition'.

transition. During the first transition phase, the ultimate task of the government is to provide niches for creativity by ensuring that supportive institutional structures are in place for green entrepreneurs. In the second phase, the government should provide legal certainty for the markets of desirable products and services by various means, ranging from phasing out old, unsustainable products and services (breaking the path dependency of the old system) to phasing in new products and services (eg through financial support or taxation). Finally, in the third phase, transition reaches its peak, and the new system is accepted as normality. Now the government should continue to protect desirable products and services and impose restrictions on undesirable products and services, but financial support programmes should be abolished.

We use the concept 'transformative legal capacity' to address the role of law in energy systems under transition. In the terminology of this article, the concept refers to the ability of the law to support the transformation of an energy system towards carbon neutrality in blue renewables.[19]

Legal systems may simultaneously both support and hinder transition. While this may be caused merely by bad legal design and unintended consequences, it may also result from trade-offs between different functions of the law. From a climate mitigation perspective, the applicable legal frameworks should have two main functions. The first function is to actively push the energy system towards low-carbon production, either through encouraging investments in renewables (phase-in instruments) or through discouraging or even rejecting the use of fossil fuels in production (phase-out instruments).[20] The second function of the legal systems is to manage trade-offs between the transition goal (here: carbon neutrality) and other societal values, such as biodiversity, which is of particular interest in the contexts of both offshore wind power generation and hydropower generation. This sets requirements as to the procedural and substantive aspects of the law, because a well-functioning legal-institutional setting must be capable of managing trade-offs between carbon neutrality and other goals, and still offer a predictable and stable operating environment for businesses. From a procedural perspective, complicated and overlapping procedures may slow down the transition to renewables. From a substantive perspective, a one-sided approach to carbon neutrality may reduce the legitimacy of transition policy and law.

Another key perspective in analysing the law is its adaptive capacity, which refers to the legal framework's ability to allow societal adaptation in the face of change without changing legislation.[21] Changes in ecosystems, technology and societal

19 Transformative and adaptive capacities are features of a system. These features can be associated to various kinds of systems, such as socio-ecological systems or legal systems. AE Camacho and RL Glicksman, 'Legal Adaptive Capacity: How Program Goals and Processes Shape Federal Land Adaptation to Climate Change' (2016) 87 Colorado Law Review 709; Ahjond Garmestani and others, 'Untapped Capacity for Resilience in Environmental Law' (2019) 116 (40) PNAS https://doi.org/10.1073/pnas.1906247116 accessed 15 December 2020.

20 Act 416/2019 forbids the use of coal in the generation of electricity and heat from 1 May 2029 onwards in Finland. It has indirect but significant impacts on the development of all forms of renewable electricity generation.

21 JB Ruhl, 'Thinking of Environmental Law as a Complex Adaptive System: How to Clean Up the Environment by Making a Mess of Environmental Law' (1997) 34 Houston Law Review 155; JB Ruhl, 'General Design Principles for Resilience and Adaptive Capacity in Legal Systems – With Applications to Climate Change Adaptation' (2011) 89 North Carolina Law Review 1382; E Biber and J Eagle, 'When Does Legal Flexibility Work in Environmental Law?' (2015) 42 Ecology Law Quarterly 787, 793–799.

values constantly challenge past legal and management decisions. From a procedural perspective, the law needs to cater for management that facilitates learning.[22] The core idea here is that the law should allow the consideration of changing environmental conditions and scientific knowledge thereof, available technologies to mitigate environmental harm and new societal goals to penetrate management practices also after an initial go-ahead for an energy project has been given. From a substantive perspective, adaptive legal capacity underscores the need for flexible standards that allow authorities discretion when considering changes to existing licenses and other authorisations in light of new scientific knowledge.[23] To take an example from the hydropower sector in Finland, although small-scale (less than 1 MW capacity) hydropower was important in advancing the economy of the country after the World Wars despite ecological trade-offs, the current legal-ecological requirements, scientific knowledge about aquatic biodiversity, the role of small-scale hydropower in the energy mix and changes in societal values call for adaptation.[24] Of particular importance here is the good ecological water status requirement stated in the EU Water Framework Directive.[25] Achieving this objective in rivers harnessed for hydropower is impossible without changes to (adaptation of) previous, legally binding decisions.

Similarly to transformative legal capacity, legal systems may either support adaptation in the face of change or hinder it. Some of the hindering elements are at the core of developed legal systems, such as the right to property and protection of the legitimate interests of an energy producer. In the context of adaptive legal capacity, a central question is how the legal framework balances predictability and flexibility, and who pays the price of adaptation.

This section has established transformative and adaptive capacities as two perspectives on legal systems. A legal framework supporting the integration of carbon neutrality and extensive biodiversity needs both capacities at different points in time. Transformative capacity is needed to drive new, promising energy production technologies and to carve a niche for them in the markets. Adaptive capacity is needed after the initial operating plans and permits have been granted but changes in social, ecological and technological circumstances warrant a re-evaluation of past plans and permits. The next section will contextualise wind power and hydropower generation in Finland and analyse whether the EU and Finnish legal frameworks allow a transformation in the offshore wind power sector (increasing offshore wind power

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22 Ruhl, 'Thinking of Environmental Law as a Complex Adaptive System' (n 21) 158–159; GA Arnold and LH Gunderson, 'Adaptive Law and Resilience' (2013) 43 Environmental Law Reporter 10436, 10438–10442. On page 10440 they state:

> All four elements are critical: (1) continuous monitoring of multiple indicators of system functions and resilience; (2) assessment of data from monitoring; (3) scientific and social learning from the lessons that the monitoring and assessment provide about the effects of particular decisions or actions; and (4) adaptation of plans, policies, programs, management, governance, and laws based on these lessons learned.

23 Arnold and Gunderson (n 22). AE Camacho and RL Glicksman, 'Legal Adaptive Capacity: How Program Goals and Processes Shape Federal Land Adaptation to Climate Change' (2016) 87 Colorado Law Review 709.

24 Soininen and others (n 11).

25 Directive of the European Parliament and of the Council 2000/60/EC of 23 October 2000 establishing a framework for the EU Community action in the field of water policy [2000] OJ L 327/1 (Water Framework Directive).

generation) and adaptation in the hydropower sector (decreasing particularly small-scale generation).

3. Legal transformative capacity for a rapid increase in offshore wind power generation

3.1. *Context*

Wind power – onshore and offshore together – still plays a minor role in the Finnish electricity system: only seven per cent of the consumed electricity is generated by wind.[26] However, the sector is growing rapidly.[27] By the first half of 2020, the overall wind power capacity in Finland was more than 18,500 MW, of which offshore projects accounted for 2,700 MW.[28] Currently, there is only one offshore wind farm in use (Tahkoluoto). Finland, a large country with a low population density and significant potential for onshore wind power, does not have the same need to push electricity generation to the sea as do countries with higher population densities. Nevertheless, the role of offshore wind power generation could be central in the Finnish energy transition portfolio.[29]

High investment cost – including for cables connecting wind farms to the grid – is a key factor limiting a significant increase in offshore wind power generation.[30] In Finland, harsh winter conditions inflict additional costs. Moreover, offshore wind farms are located far from the shore, and technical problems increase operating costs.[31] Despite these difficulties, the investment and operating costs of offshore wind power are estimated to decrease significantly due to technological development in the coming years.[32] The marine areas close to Finland are also relatively shallow, which decreases construction costs in comparison to those of many other countries in Europe and elsewhere.[33] This makes offshore installations in Finland particularly attractive.

Wind power, both onshore and offshore, has adverse environmental effects. The construction of wind farms may reduce, fragment and degrade habitats for wildlife, fish and plants. Spinning turbines pose a threat to flying species such as birds and bats. Noise may disturb animals, including marine mammals and fish. The threat to birds is perhaps the most evident, but it is worth noting that wind energy causes

26 Motiva Ltd., 'Tuulivoima Suomessa' (Wind Power in Finland) www.motiva.fi/ratkaisut/uusiutuva_energia/tuulivoima/tuulivoima_suomessa accessed 14 October 2020.

27 By 22 per cent, year 2019. Findicator/Statistics Finland, 'Uusiutuvat energialähteet' (Renewable Energy Sources) https://findikaattori.fi/fi/89 accessed 14 October 2020.

28 Finnish Wind Power Association, 'Wind Power Projects under Planning in Finland' https://tuulivoimayhdistys.fi/en/wind-power-in-finland/projects-under-planning accessed 30 June 2020.

29 Granskog and others (n 4).

30 AC Levitt, 'Pricing Offshore Wind Power' (2011) 39 Energy Policy 640; Sundelin and Putkonen (n 9); MJ Kaiser, 'Modeling Offshore Wind Installation Costs on the US Outer Continental Shelf' (2013) 50 Renewable Energy 676; GlobalData UK Ltd, 'Grid Connectivity Issues Faced by the German Offshore Wind Industry' (Report 2012); D Ahsan, 'The Influence of Stakeholder Groups in Operation and Maintenance Services of Offshore Wind Farms: Lesson from Denmark' (2018) 125 Renewable Energy 819.

31 C Koch, 'The More the Better?' (2014) 19(1) Journal of Financial Management of Property and Construction 24; Ahsan (n 30).

32 Granskog and others (n 4).

33 *Ibid* 38.

only a small portion of all human-related killings of birds (1 out of 250).[34] Onshore and offshore wind power plants have different environmental impacts, which makes it difficult to compare them.[35] The main impacts of offshore wind energy production on marine species occur during the construction period,[36] and shallows, which are the cheapest to build, are often biodiversity hotspots.[37]

Offshore wind power generation has important advantages in comparison to its onshore counterpart. Offshore wind farms do not alter landscapes, nor do they generate as much noise as onshore farms,[38] and they cause fewer conflicts because they are located farther away from residential areas.[39] An offshore wind turbine produces roughly 30 per cent more power than a similar onshore turbine, because of larger turbine sizes and economies of scale.[40] While this advantage does not yet make offshore wind power generation more cost-effective than onshore generation, this is likely to happen in the near future. Moreover, offshore generation reduces costs,[41] because it provides a more stable power output than onshore generation. There is also a geographical component favouring offshore generation: while onshore farms are typically located in remote areas far from high-voltage power lines, the Finnish coast is packed with cities and existing high-voltage lines, which translates into less pressure for re-building the existing grid and a reduced loss of electricity thanks to shorter transmission lines.[42]

3.2. *Legal instruments for transformation: renewable energy targets and state aid*

The objectives of increasing the role of renewables in energy production stem from the EU and Finnish legal systems. The European Union has made a series of decisions to implement international climate policy and to go beyond it. The most important EU directive issued to increase the role of renewables in the energy mix is the revised

34 R Saidur and others, 'Environmental Impact of Wind Energy' (2011) 15 Renew Sustain Energy Review 2423; Wallace P Erickson and others, 'A Comprehensive Analysis of Small-Passerine Fatalities from Collision with Turbines at Wind Energy Facilities' (2014) 9(9) PLOS One <https://doi.org/10.1371/journal.pone.0107491> accessed 15 June 2020.

35 JK Kaldellis and others, 'Environmental and Social Footprint of Offshore Wind Energy. Comparison with Onshore Counterpart' (2016) 92 Renewable Energy 543.

36 MS Nazir and others, 'Environmental Impact and Pollution-Related Challenges of Renewable Wind Energy Paradigm – A Review' (2019) 683 Science of The Total Environment, 436.

37 The Plan Bothnia project, coordinated by the HELCOM Secretariat, tested transboundary Maritime Spatial Planning (MSP) in the Baltic Sea. The project used the Bothnian Sea area between Sweden and Finland as a case study of Baltic transboundary MSP. The outcome of it is: Hermanni Backer and Manuel Frias (eds), 'Planning the Bothnian Sea – Key Findings of the Bothnia Project' (2013) https://helcom.fi/wp-content/uploads/2019/11/Planning-the-Bothnian-Sea.pdf accessed 15 December 2020 (at page 89 various interests are gathered together).

38 J Ladenburg, 'Attitudes Towards On-Land and Offshore Wind Power Development in Denmark; Choice of Development Strategy' (2008) 33 Renewable Energy 111.

39 M Bilgili, 'Offshore Wind Power Development in Europe and Its Comparison with Onshore Counterpart' (2011) 15 Renewable and Sustainable Energy Reviews 905.

40 Levitt (n 30).

41 International Energy Agency, *Offshore Wind Outlook 2019* (IEA 2019) www.iea.org/reports/offshore-wind-outlook-2019 accessed 30 June 2020; Granskog and others (n 4)
EESI, 'Fact Sheet – Offshore Wind: Can the United States Catch up with Europe?' (Environmental and Energy Study Institute, 4 January 2016) www.eesi.org/papers/view/factsheet-offshore-wind-2016 accessed 30 June 2020.

42 Granskog and others (n 4).

Renewable Energy Directive (REDII)[43] that establishes a new, binding renewable energy target for the EU: at least 32 per cent renewables by 2030 and a possible upward revision by 2023. The previous renewable energy directive[44] required that the EU member states produce at least 20 per cent of their total energy with renewables by 2020. For Finland, the 2020 target was 38 per cent, which has already been reached. Currently, roughly 40 per cent of all the energy produced in Finland comes from renewables.[45] Furthermore, the Finnish government has a national renewable energy target of 50 per cent for the 2020s.

National support schemes for renewable energy are conditioned by the RES directive and state aid regulation. The recent EU Strategy on Offshore Renewable Energy[46] indicates that amendments to support schemes, aiming to give a new push to offshore wind energy, are likely to emerge in the coming years. The coming changes are limited by Article 6 of the RES directive, which requires that member states ensure that the level of, and the conditions attached to, the support granted to renewable energy projects are not revised in a way that negatively affects the rights conferred thereunder or undermines the economic viability of projects that already benefit from support.

According to Art. 4 of the RES directive, member states are allowed to adopt support schemes to reach or exceed the set Union target. An important starting point is that support for electricity from renewable sources is granted in an open, transparent, competitive, non-discriminatory and cost-effective manner. However, tendering procedures may be limited to specific technologies on certain conditions (Art. 4(5)). From the offshore wind power point of view, the interesting derogation grounds are (a) the long-term potential of a particular technology, (b) the need to achieve diversification, and (c) grid integration costs. All these grounds could provide a justification for tendering procedures limited to offshore technology. In addition, member states may also exempt small-scale installations and demonstration projects from tendering procedures.[47]

In Finland, a key national instrument for promoting wind power generation is a state aid scheme, based on competitive bidding, for the development of renewable energy.[48] Wind, solar and wave power, as well as biomass and biogas production, are eligible for state aid, but hydropower generation is not. Production subsidies (operation support) for renewable energy were originally based on a feed-in tariff system, but this has gradually changed towards a premium-based system. The system in use is a combination of two of the most common subsidy systems: a feed-in-tariff system and an auction system.[49] The idea is to find producers who commit to generating electricity

43 Directive of the European Parliament and of the Council 2018/2001 of 11 December 2018 on the Promotion of the Use of Energy from Renewable Sources [2018] OJ L 328/82 (Renewable Energy Directive).

44 Directive 2009/28/EC of 23 April 2009 on the Promotion of the Use of Energy from Renewable Sources and Amending and Subsequently Repealing Directives 2001/77/EC and 2003/30/EC [2009] OJ L 140 16 (RES Directive).

45 Ministry of Economic Affairs and Employment of Finland, 'Renewable Energy in Finland' (official web page of the Ministry 2020) https://tem.fi/en/renewable-energy accessed 30 June 2020. The Ministry is responsible for energy policy in Finland.

46 *Ibid*.

47 RES Directive, art 4.4.

48 Act on Support of the Production of Electricity from Renewable Sources (1396/2010) (Finland 2010).

49 Lucy Butler and Karsten Neuhoff, 'Comparison of Feed-in Tariff, Quota and Auction Mechanisms to Support Wind Power Development' (2008) 33(8) Renewable Energy 1854.

with renewable technologies for as low a premium as possible. In practice, onshore wind energy operators have won the only competitive biddings organised under the new statute,[50] and many new onshore wind energy farms are built without financial support.

The policy of technology neutrality may have a significant impact on offshore wind power generation in the current situation, where onshore wind power is economically viable. The policy of technology neutrality was supported by both EU[51] and Finnish energy policy and law,[52] although the new RES directive and EU strategy[53] on offshore renewable energy may bring a change in the future. Technology neutrality is backed by the assumption that it has a positive effect on technological development.[54] However, there are indications suggesting that technology neutrality may not always be ideal in the long run.[55] The new RES directive improves the situation by allowing tendering procedures that are limited to specific technologies on grounds that may be applied for the benefit of offshore wind power production. Offshore wind power may provide a number of advantages in comparison to onshore wind energy, including fewer conflicts and less environmental harm. Moreover, it would be easier to locate offshore wind power farms close to current strong North–South transmission lines than onshore wind power farms due to insufficient land availability. Close location to these lines would reduce the costs for the grid.[56] The new offshore renewable energy strategy also indicates that there are better possibilities to achieve offshore renewable-specific support schemes.

Changes in other economic incentives could also speed up the building of offshore wind farms. A property tax reform, making the amount of tax paid per kWh produced offshore equal to the tax paid onshore, would remove one significant economic barrier. In fact, the policy programme of the current government promises this sort of reform.[57] Moreover, the cost of transmission lines, which tend to be rather long in the case of offshore wind energy, could be shared between the operator and the government, as is done for example in Germany and Denmark.

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50 Energy Authority of Finland, 'Uusiutuvan energian tarjouskilpailun tulokset' (Information Event Presentation 27 March 2019 Helsinki, Energy Authority) https://energiavirasto.fi/documents/11120570/12854466/Preemion±tulosten±info±2019-03-27.pdf/3cf624fd-e373-dd06-b4a0-e70cb5a46cfd/Preemion±tulosten±info±2019-03-27.pdf accessed 30 June 2020.

51 EU Commission, 'Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, Energy Roadmap 2050' COM (2011) 885 final 3.

52 'Government Report on the National Energy and Climate Strategy for 2030' Publications of the Ministry of Economic Affairs and Employment, Energy 4/2017, 14.

53 See n 3.

54 D Driesen, *The Economic Dynamics of Environmental Law* (MIT Press 2003) 50–55.

55 Wim Carton, '"Money for Nothin" and Coal for Free: "Technology Neutrality" and Biomass Development under the Flemish Tradable Green Certificate Scheme' (2016) 70 Geoforum 69; see also A Verbruggen and V Lauber, 'Assessing the Performance of Renewable Electricity Support Instruments' (2012) 45 Energy Policy 635; A Bergek and S Jacobsson, 'Are Tradable Green Certificates a Cost-Efficient Policy Driving Technical Change or a Rent-Generating Machine? Lessons from Sweden 2003–2008' (2010) 38(3) Energy Policy 1255.

56 Granskog and others (n 4) 48.

57 Prime Minister Sanna Marin's Government (n 2).

3.3. *Integration of spatial planning and permit schemes to cut down transaction costs and to reduce biodiversity trade-offs*

In addition to state aid, another key issue is how well spatial plans and permits are integrated so that they do not incur excessive transaction costs to the developers. The development of the EU and Finnish legal frameworks have sought to address these questions by integrating spatial planning and permits.

The Maritime Spatial Planning Directive[58] (MSP) establishes a framework for reconciling different uses of marine waters.[59] The directive aims to support sustainable development and growth in the maritime sector, applying an ecosystem-based approach, and to promote the coexistence of relevant activities and uses.[60] Maritime spatial plans cover at least energy, maritime transport, fisheries and aquaculture, and protection and improvement of the environment, including resilience to climate change impacts. They may also cover other sectors such as sustainable tourism and sustainable extraction of raw materials. Maritime spatial plans, which must be prepared by March 2021, aim to identify the spatial and temporal distribution of relevant activities and uses in marine waters.

In Finland, the EU Maritime Spatial Planning Directive is implemented with the Land Use and Building Act (132/1999), and a draft for three Maritime Spatial Plans (MSPs) covering the Finnish marine waters was accepted in late 2020 by national authorities.[61] The Maritime Spatial Plans, when finalised, inform other planning and permit authorities of the most suitable locations for wind power generation, but they do not set legally binding restrictions on the placement of activities.[62] MSPs are informative strategic instruments that contain a significant amount of spatial and other information on how to integrate various activities and, ultimately, contribute to an integrated and strategic vision of the sea areas.

In addition to MSPs, there are two relevant national spatial planning instruments, the regional plan and the general plan, which are also regulated by the Land Use and Building Act. These plans have legal effects on lower-level decisions such as building permits. They cover the territorial waters, whereas the maritime spatial plans cover both the territorial waters and the Exclusive Economic Zone.

As noted above, shallows are important for nature conservation, and a key reason why offshore wind energy has great potential in Finnish marine areas is the fact that they contain many shallows. While the drafts for the legally non-binding Maritime Spatial Plans aim to keep offshore wind farms outside protected areas,[63] it is not possible to forecast the end result in the long run.

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58 Directive of the European Parliament and of the Council 2014/89/EU of 23 July 2014 Establishing a Framework for Maritime Spatial Planning [2014] OJ L 257/135 (Directive on Maritime Spatial Planning).

59 Niko Soininen and Daud Hassan, 'Marine Spatial Planning as an Instrument of Sustainable Ocean Governance' in Daud Hassan, Tuomas Kuokkanen, and Niko Soininen (eds), *Transboundary Marine Spatial Planning and International Law* (Routledge 2015) 3.

60 Niko Soininen, 'Marine Spatial Planning in the European Union' in Daud Hassan, Tuomas Kuokkanen, and Niko Soininen (eds), *Transboundary Marine Spatial Planning and International Law* (Routledge 2015), 189.

61 Maritime Spatial Plan for Finland 2030 https://meriskenaariot.info/merialuesuunnitelma/en/merialuesuunnitelma-english/ accessed 28 December 2020.

62 Land Use and Building Act (132/1992) ch 8a as amended by the Act 482/2016 (Finland 2016).

63 Maritime Spatial Plan for Finland 2030 (n 61).

Besides nature conservation, national defence also limits the location of offshore wind farms. Wind turbines may disturb military radar technologies, and to manage this risk, the Gulf of Finland and the Archipelago Sea have largely been excluded from wind power generation.[64] However, there is no general rule prohibiting the construction of wind farms in these areas. The decision is made on a case-by-case basis according to the opinion of the Finnish Defence Forces. The development of new radar technologies that can handle the noise and vibration caused by wind turbines will likely end this gridlock.

In addition to integrated spatial plans, permit procedures have been integrated to support development in wind power generation. These integration efforts are based on an understanding that lengthy and costly administrative processes and fragmented decision-making structures may slow the development of offshore wind energy. To overcome this, both planning and permit mechanisms have been streamlined during the last decade, but a wind farm may still require up to 14 planning decisions and permits or authorisations.[65] With regard to planning, the most important streamlining reform took place in 2011, when an amendment to the Land Use and Building Act (132/1999) made it possible to grant a building permit directly on the basis of the general plan without a detailed plan. In other words, one planning level was removed from most wind energy projects. Another reform made it possible to integrate the environmental impact assessment (EIA) procedure into the preparation of a land-use plan when a planning decision concerns a single project.[66] Furthermore, the so-called Natura assessment referred to in Art. 6(3) of the Habitats Directive[67] can also be integrated into the same process.[68] The operator covers the costs of preparing the assessments and the land-use plan.

The procedural integration of the water and environmental permits took place in the early 2000s. Moreover, the recent Act 764/2019 makes it possible to integrate the procedures of several other permits, including the construction permit and derogation permits under the Nature Conservation Act, into the same process. In this new system, it is up to the operator to decide whether to integrate the procedures or to handle each permit separately. Moreover, an expert group is working on a proposal to integrate all permits relevant to renewables to implement the REDII directive.[69]

A comprehensive one-stop shop permit system might speed up administrative processes further still, but it can by no means be taken for granted. This is partly due to the fact that administrative resources have been significantly reduced because of fiscal austerity and governmental streamlining reforms.[70] Reduced

64 *Ibid*.

65 Jussi Airaksinen and others, *Selvitys sähkön omatuotantoon, energiayhteisöihin ja energiahankkeiden lupamenettelyihin liittyvistä kysymyksistä* (Valtioneuvoston selvitys- ja tutkimustoiminnan julkaisusarja publication number 73, 2019).

66 Act Amending the Land Use and Building Act (252/2017) (Finland 2017).

67 Council Directive 92/43/EEC of 21 May 1992 on the Conservation of Natural Habitats and of Wild Fauna and Flora [1992] OJ L 206/7 (Habitats Directive).

68 Act Amending the Nature Conservation Act (255/2017) (Finland 2017).

69 Kari Lavaste, 'Uusiutuvan luvat saa yhdeltä luukulta vuonna 2021' (web article, Reilua Energiaa 2019) https://reiluaenergiaa.fi/lainsaadanto/uusiutuvan-luvat-saa-yhdelta-luukulta-vuonna-2021/ accessed 7 December 2020.

70 Jukka Similä, 'The Evolution of Participatory Rights in the Era of Fiscal Austerity and Reduced Administrative Burden' in Jerzy Jendrośka and Magdalena Bar (eds), *Procedural Environmental Rights: Principle X in Theory and Practice* (European Environmental Law Forum, Intersentia 2018).

resources in administration tend not to speed up processes. Furthermore, in an *ex ante* evaluation of the newest streamlining reform of environmental permits, many – although not all – interviewed experts thought that the one-stop shop creates so demanding a coordination task for the administration that it may prolong administrative processes rather than speed them up.[71] Furthermore, having a definite deadline for permit processes, as required in the REDII, may lead to hasty decisions, with the result that administrative decisions are overruled in court and remitted to the administrative body more often than in the previous system. This is particularly relevant in the case of offshore wind power projects, which tend to be very large and complicated. In other words, a one-stop shop may lead to single-minded decision-making, thus losing its contextual flexibility. While the incorporation of the REDII requirements into the processes is a legal necessity, operators should have the possibility to choose whether to activate the one-stop shop track or to apply for each permit separately, as is the case in the current Finnish one-stop shop model. Operators have the best knowledge to evaluate which course of action suits their project best.

One option to reduce the administrative burden of power companies operating in marine areas is to adopt the management scheme that has been used in onshore projects already since 2009, and very recently in the first similar offshore project that has been launched in state-owned marine waters.[72] In this scheme, the government authority managing state-owned areas, Metsähallitus, takes responsibility for all the administrative steps needed to establish a wind farm and then transfers the permits and subsequent legal rights and obligations to power companies through competitive tendering.[73] Competitive tendering concerns only the concession contract, whereas the ownership of land (or, in this case, water area) is not transferred.[74] Typically, Metsähallitus carries out an environmental impact assessment, possibly including a Natura 2000 assessment, prepares a general plan and applies for all the needed permits. Metsähallitus also assumes the responsibility for the appeals processes. The duration of the whole scheme, from the EIA to the legally valid administrative decisions, is typically from 4 to 5 years. In the rare cases when there are no appeals, it takes roughly 2 years, sometimes less. The power company will cover all the costs, but it will benefit from being able to start building the wind farm soon after it has made the investment decision and the competitive tendering process has been finalised. Transferring this mode of operation to offshore wind farms could significantly promote offshore wind power generation.

71 Governmental Bill HE 269/2018 vp (Finland), 38–46.

72 Metsähallitus 'Metsähallitus Submitted a Planning Proposal for the Offshore Wind Farm to the Municipality of Korsnäs' (Press Release of State Enterprise Metsähallitus, 16 November 2020) www.metsa.fi/en/press-releases/metsahallitus-submitted-a-planning-proposal-for-the-offshore-wind-farm-to-the-municipality-of-korsnas/ accessed 7 December 2020.

73 Metsähallitus, 'Focus on Wind Power' (website) www.metsa.fi/web/en/wind-power accessed 30 June 2020. Competitive tendering is regulated by the Act on Public Procurement and Concession Contracts (1397/2016).

74 Discussion with Olli-Matti Tervaniemi (Metsähallitus) on 22 February 2020.

3.4. *Regulation of biodiversity trade-offs*

The backbones of EU nature conservation law are the Birds Directive[75] and the Habitats Directive, which aim to achieve and maintain the favourable conservation status of protected habitats and species in both terrestrial and aquatic environments. From the perspective of offshore wind energy, perhaps the most important requirements for protected areas are set in Art. 6 of the Habitats Directive, where an assessment procedure is specified for a project likely to have a significant effect on the objectives set for a protected area either individually or in combination with other plans or projects. National authorities may approve a project or a plan only if it will not adversely affect the integrity of a Natura 2000 site. However, a plan or a project may be carried out regardless of a negative assessment for imperative reasons of overriding public interest, including those of a social or economic nature, provided that there are no alternative solutions. In this case, a member state needs to take all compensatory measures necessary to ensure that the overall coherence of Natura 2000 is protected.

Both EU nature conservation directives prohibit the deliberate killing or disturbance of protected species, and the question is whether the killings by wind turbines are considered deliberate, so that a derogation is needed.[76] The Court of Justice of the European Union has defined it as follows: ' … [it is] proven that the author of the act intended the capture or killing of a specimen belonging to a protected animal species or, at the very least, accepted the possibility of such capture or killing'.[77] One might assume that a wind farm investor accepts the possibility of such killing. Furthermore, the deterioration or destruction of breeding sites or resting places of the Annex IV species of the Habitats Directive is forbidden,[78] and again, these sites may be destroyed by offshore wind farms. A derogation from the rules is possible if the strict conditions of Art. 16 of the Habitats Directive or Art. 9 of the Birds Directive are met. These rules should be taken into account in decision-making related to the location of an offshore wind farm.

Some of the best potential sites for generating offshore wind power are located in areas with strong ecological upwelling.[79] Nature conservation law tends to be strict, and EU nature conservation law makes no exception. Its flexibility is based on exemption rules, which also include compensatory measures. Still, the requirement that 'derogation is possible only if the net result of a derogation is neutral or positive for a species'[80] may significantly affect the acceptability of wind farms. A

75 Directive of the European Parliament and of the Council 2009/147/EC of 30 November 2009 on the Conservation of Wild Birds [2009] L 20/7 (Birds Directive).

76 Habitats Directive art 12 and Birds Directive art 5.

77 Case C-221/04 *Commission v Spain* [2006] ECR I-4515, para 71. See similar cases: Case C-103/00 *Commission v. Greece (Caretta Caretta case)* [2002] ECR I-1147; Case C-221/04 *Commission v Spain (the Lutra Lutra case)* [2006] I-4515. See also: Commission, 'Guidance Document on the Strict Protection of Animal Species of Community Interest under the Habitats Directive 92/43/EEC' (2007), 36 https://ec.europa.eu/environment/nature/conservation/species/guidance/pdf/guidance_en.pdf accessed 30 June 2020.

78 Habitats Directive art 12. Recently, the Finnish Supreme Administrative Court (SACF) annulled a land use plan based on insufficient impact assessment of onshore wind farm on the breeding sites and resting places of wolves (SACF 2019:160).

79 Sundelin and Putkonen (n 9); Backer and Frias (n 37).

80 EU Commission, 'Guidance Document on the Strict Protection of Animal Species of Community Interest under the Habitats Directive 92/43/EEC' (2007), 62.

report[81] edited by Chris Backes and Sanne Akerboom suggests that the tension between protected species and wind energy should be addressed 'on a higher level than the level of individual projects' – that is, at the national level or even higher. They call for

> an integrated approach which identifies the needs of sustainable energy projects (like new locations and upscaling existing wind farms), the best locations and mitigation measures, the negative consequences for (certain, important) protected species which will occur albeit mitigation measures are taken and, where indicated, measures to improve the conditions for the species concerned within, but also outside the areas needed for sustainable energy projects.

They claim that this would be a way to avoid trade-offs involving protected species and, at the same time, to reduce the administrative burden on and legal risks of renewable energy projects. In the Finnish context, we can conclude that maritime spatial planning combined with national land-use plans for marine areas and permit mechanisms provides, in principle, a means to handle the conflict between protected species and wind energy at a level higher than that of individual projects, as suggested by Backes and Akerboom. Today, as only one offshore wind farm is in operation and others are still at the planning stage, it is not yet possible to evaluate how successfully these means are used in practice.

4. Legal adaptive capacity for decreasing and adjusting existing hydropower generation

4.1. *Context*

In Finland, blue renewables generation has traditionally focused on hydropower, which has been part of the Finnish energy system since the late 19th century. In the 1950s and 1960s, domestic hydropower accounted for as much as 90 per cent of the overall electricity generation capacity in the country.[82] Currently, hydropower accounts for 10–20 per cent of the total generation, depending on the annual rainfall.[83] In total, Finland hosts some 250 hydropower projects with a generation capacity of 3,200 MW. According to domestic classification, 67 plants are small hydropower projects (1–10 MW) and 83 are mini hydropower projects (<1 MW). The small hydropower projects account for roughly eight per cent, and mini hydropower projects one per cent, of the total hydropower generation capacity.[84]

81 Chris Backes and Sanne Akerboom, 'Renewable Energy Projects and Species Protection. Comparison into the Application of the EU Species Protection Regulation with Respect to Renewable Energy Projects in the Netherlands, United Kingdom, Belgium, Denmark and Germany' (Utrecht Centre for Water, Oceans and Sustainability Law 2018).

82 ÅF-Consult Oy, 'Vesivoiman merkitys Suomen energiajärjestelmälle' https://energia.fi/files/3427/Vesivoimaselvitys_FINALrev1_20190206.pdf accessed 15 June 2020.

83 Alireza Aslani and others, 'Energy Diversification in Finland: Achievements and Potential of Renewable Energy Development' (2013) 32(5) International Journal of Sustainable Energy 504; ÅF-Consult Oy (n 82).

84 Motiva Oy, Small Hydropower Projects www.motiva.fi/ratkaisut/uusiutuva_energia/vesivoima/pienvesivoima accessed 16 December 2020.

Before the hydropower boom, at the turn of the 20th century, Finland boasted 25 Atlantic salmon (*Salmo salar*) and some 70 anadromous brown trout (*Salmo trutta*) rivers running into the Baltic Sea, four rivers supporting both species (Teno, Näätämö, Paatsjoki, Tuulomajoki) with outlets to the Barents Sea, and two inland rivers with reproducing landlocked Atlantic salmon populations. Currently, only four Finnish rivers sustaining natural reproduction of salmon remain, and only small and rare populations of wild anadromous brown trout, migratory whitefish and migratory grayling have survived in rivers with a connection to the Baltic Sea. The nearly complete loss of spawning habitats for migratory salmonids resulted primarily from large-scale damming of rivers for hydropower generation.[85]

The damming of Finnish rivers started from Southern Finland at the turn of the 20th century and proceeded to the rural northern provinces from the 1940s onward.[86] Today, almost all major Finnish rivers discharging into the Baltic Sea are dammed.[87] It is currently acknowledged that hydropower generation cannot be significantly increased in Finland, as most of the remaining free rivers have been protected by laws prohibiting the building of new hydropower, such as the Act on the Protection of Rapids (35/1987). Rivers with existing hydropower projects have some potential for increased generation. One large-scale (44 MW generation capacity) hydropower permit was in fact granted to the Kemijoki River in 2017 (Sierilä) with major societal debate over biodiversity trade-offs. There are also some prospects for modernising old turbines and streamlining river flows for optimal power generation in already harnessed rivers. Entirely new projects, however, are rare and there are no prospects for significantly increasing hydropower generation in Finland within the current legal framework. On the contrary, the extensive negative impact on aquatic biodiversity continues to draw increasing societal and legal attention, so much so that there are significant pressures to mitigate the harm caused by hydropower to fisheries, and even to decommission some of the existing projects. The hydropower sector is called upon to adapt to the changing societal, legal and ecological circumstances.

4.2. *A legal and policy push for adaptation in the hydropower sector*

Given the grim history of Finnish salmonid stocks and the extensive damming of Finnish rivers, it is no surprise that the past decades have witnessed major political and legal efforts in several forums to restore the ecological flows of the Finnish rivers and to resurrect some of the lost aquatic biodiversity. To reflect this, in 2012 the Finnish government issued a National Fishway Strategy aiming to restore the natural reproductive cycle of migratory fish populations and prioritising restorative actions in watersheds with the highest potential to this end.[88]

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85 HELCOM, 'Salmon and Sea Trout Populations and Rivers in the Baltic Sea – HELCOM Assessment of Salmon (*Salmo salar*) and Sea Trout (*Salmo trutta*) Populations and Habitats in Rivers Flowing to the Baltic Sea' (Baltic Sea Environment Protection No 126A, 2011).

86 Outi Autti and Timo P Karjalainen, 'The Point of No Return – Social Dimensions of Losing Salmon in Two Northern Rivers' (2012) 41(5) Nordia Geographical Publications 45.

87 HELCOM, 'Salmon and Sea Trout Populations and Rivers in the Baltic Sea' (n 85).

88 Government of Finland, 'Kansallinen kalatiestrategia' (Government Resolution 8.3.2012) http://mmm.fi/documents/1410837/1516655/1-4-Kansallinen_kalatiestrategia2012.pdf/fae1c9f2-2908-4859-82ce-0b46c612f179 accessed 16 December 2020.

The most significant push to adapt hydropower generation to ecological needs stems from the EU level, namely from the Water Framework Directive. The Water Framework Directive, in force since 2000, marks a significant change in the European governance of inland surface waters, coastal waters and transitional waters. It requires EU member states to establish river basin districts that are based on geographical and hydrological boundaries instead of administrative or political boundaries.[89] The directive aims at achieving, among other things, Good Ecological Status of all the said waters by 2015 or, failing that, by 2021 (or 2027) at the latest. Simultaneously, all waters in less than good status are regulated by the non-deterioration clause, which requires EU member states to implement all necessary measures to prevent further deterioration of their water bodies.[90] The Good Ecological Status of a river (or part of a river) requires, with regard to fish fauna, that there are only slight changes in species composition and abundance attributable to anthropogenic impacts.[91] Also, hydro-morphological quality elements, such as the quantity and dynamics of water flow and river continuity, must be considered in the classification of ecological status.[92]

The above-listed biological and hydro-morphological quality elements are somewhat different if a stretch of river is classified as 'artificial and heavily modified' due to damming and the production of hydropower.[93] In this case, an EU member state, for example Finland, has an obligation to pursue the Good Ecological Potential target, which is established by comparing the ecological status of the river to the Maximum Ecological Potential of the water body. In practice, the latter refers to the ecological quality achievable 'once all mitigation measures that do not have significant adverse effects on its specified use [here: hydropower] or on the wider environment have been applied'.[94] Good Ecological Potential requires that there are only slight changes in the quality elements as compared to the Maximum Ecological Potential.

The Water Framework Directive requires that the member states re-evaluate all the existing impoundment and other water management permits to bridge the gap between the existing and the Good Ecological Status/Potential of all waters in their territory.[95] In the Weser ruling, the Court of Justice of the EU declared that the environmental goals of the Directive are legally binding as regards the authorisation of an individual project.[96] While the legally binding nature of Good Ecological Status may introduce far-reaching legal consequences for the re-evaluation of existing permits, the Good Ecological Potential target sets more modest standards for the heavily modified rivers. Obtaining the Good Ecological Potential classification does not require cancellation of hydropower permits or dam removals, but it might well require a wide array of mitigation measures to allow a natural reproductive cycle for salmon and trout as far

89 See also Lorenzo Squintani and Helena van Rijswick, 'Improving Legal Certainty and Adaptability in the Programmatic Approach' (2016) 28 Journal of Environmental Law 443.

90 Water Framework Directive art 4.

91 Water Framework Directive annex V.

92 *Ibid*.

93 Water Framework Directive art 2(9) and art 4(1).

94 Common Implementation Strategy for the Water Framework Directive (2000/60/EC), Guidance Document No. 4 'Identification and Designation of Heavily Modified and Artificial Water Bodies' (2003).

95 Water Framework Directive art 11(3) and art 11(5).

96 Case 461/13, *Bund für Umwelt und Naturschutz Deutschland eV v Bundesrepublik Deutschland* [2015] ECLI:EU:C:2015.

as technically possible and economically feasible. These measures may include building fishways, watering original drained channels, restoring dredged rivers, transferring fish over the dams and improving river flow regulation.[97]

Most of the Finnish rivers dammed for hydropower have been classified as artificial and heavily modified. Notwithstanding the less demanding ecological quality criteria, 66 per cent of the artificial and heavily modified rivers (or parts of rivers) in Finland were not in compliance with the Good Ecological Potential criteria during the first Water Framework Directive planning period between 2004 and 2009.[98] Against this background, the directive's obligations cast a long shadow, especially on those hydropower permits that do not currently contain any requirements to mitigate hydropower harm to fisheries.

The dire situation of salmon and trout in Finland has also attracted attention at the international level, mainly under the 1992 Helsinki Convention.[99] In the 2007 Baltic Sea Action Plan, the Baltic Sea states agreed to develop restoration plans for migratory routes and spawning sites to reach a favourable conservation status of Baltic Sea biodiversity.[100] The Baltic Marine Environment Protection Commission (Helsinki Commission - HELCOM) has also recommended that the states take urgent measures to restore the original salmon and sea trout populations.[101] In this regard, Finland should assess the anthropogenic hindrances to fish migration in its territory and commit to re-establishing wild salmon populations in certain rivers, where justified.[102]

Overall, the legal and policy developments at all three levels (national, EU, international) have sought to establish a balance between hydropower generation and biodiversity. The Water Framework Directive in particular is inflicting significant pressure to re-evaluate existing hydropower projects. This pressure is felt especially as a requirement to use a full array of mitigation measures (fishways, fish transfers, restocking) in pursuing the Good Ecological Status/Potential target.

4.3. *Legal adaptation challenges: hydropower as private property and permanence of permits*

In terms of legal adaptive capacity, the most significant challenge in re-evaluating existing hydropower permits stems from Finnish water law. The 2011 Water Act and its predecessors (1961 Water Act 264/1961; 1902 Water Rights Act 31/1902) are based on a doctrine of permanence maintaining that once the environmental impacts of a hydropower project have been established in a water management permit and the project has secured a permit to operate, the permit cannot

97 Government of Finland (n 88).

98 Finnish Environment Institute, 'Vesienhoidon suunnittelun ohjeistus 2. kaudelle. Voimakkaasti muutettujen ja keinotekoisten pintavesien tunnistaminen ja tilan arviointi' (Guidebook, 2013) http://www.ymparisto.fi/download/noname/%7B755CCAF4-99E3-46F9-AB0C-E38B90A2E924%7D/74887 accessed 16 December 2020.

99 Convention on the Protection of the Marine Environment of the Baltic Sea Area. Entered into Force on 17 January 2000.

100 HELCOM, *Baltic Sea Action Plan* (2007). Adopted on 15 November 2007 in Krakow, Poland by the HELCOM Extraordinary Ministerial Meeting.

101 HELCOM, 'Salmon and Sea Trout Populations and Rivers in the Baltic Sea' (n 85).

102 *Ibid*.

be revoked or considerably adjusted without the consent of the hydropower operator.[103] The permits granted to hydropower operators are considered to manifest private ownership of the rivers, which is protected by section 15 of the Constitution of Finland (731/1999).[104]

On the basis of the permanence doctrine, and private ownership of the rivers, the 2011 Water Act currently in force does not allow for entirely new permit conditions to be added to an existing hydropower permit.[105] The permits of small (under 5 MW) hydropower projects especially quite often (38 projects out of 153 that were studied) lack conditions for mitigating harm to fisheries.[106] Furthermore, even the alteration of existing hydropower permit obligations is contingent on several, rather strict, legal criteria.[107] These criteria include the existence of a public interest to revive migratory fish stocks,[108] a change in the socio-ecological circumstances,[109] and a finding that the changes in permit obligations do not constitute disproportionate costs to the hydropower operator.[110] It is especially the last criterion that often proves difficult to fulfil in the current constitutional setting.

Overall, the 2011 Water Act and its predecessors have adopted a dualistic approach to adaptation. The law has been – and still is – remarkably adaptive to socio-ecological knowledge in permitting *new* hydropower projects and defining their mitigation measures.[111] This close linkage between science, policy and law is, however, in stark contrast with the strict permanence of *existing* hydropower permits.[112] The doctrine of permanence, coupled with private ownership of the rivers, creates an atmosphere of maladaptivity that presents obstacles for adjusting the past water management decisions to new developments in policy and law, as well as to new scientific knowledge. This is especially problematic in the context of small hydropower projects that may be insignificant in terms of energy security, or any other societal interest, but still continue to enjoy legal protection despite disproportionate harm to biodiversity. For this reason, dozens of Finnish rivers continue to generate marginal hydropower with significant ecological trade-offs

103 Soininen and others (n 11), 5–6; Antti Belinskij and Niko Soininen, 'Vaelluskalakantojen oikeudellinen elvyttäminen ja vesivoima' in Tapio Määttä and others (eds), *Ympäristöpolitiikan ja –oikeuden vuosikirja* (LYY Institute of Uni of Eastern Finland 2017), 89.

104 Soininen and others (n 11); Belinskij and Soininen (n 103); Matti Hepola, *Oikeusvoimaopin transformaatio. Siviiliprosessioikeudellisen oikeusvoimaopin muuttuminen ja siirtyminen hallinto- ja ympäristöoikeuteen ympäristöluvan pysyvyyden kannalta* (Edilex 2015); Matti Hepola, 'Kalatalousvelvoite muutoksen tuulissa' in *Vesi, ympäristö ja oikeus: Juhlakirja Pekka Kainlaurille* (Vaasa Administrative Court, Vaasa 2007).

105 Soininen and others (n 11); Belinskij and Soininen (n 103).

106 Niina Kosunen and Ida Mikkola, 'Selvitys Suomen alle 5 MW vesivoimalaitosten sekä niihin välittömästi liittyvien säännöstelyhankkeiden vesilain mukaisten lupien kalatalousvelvoitteista' (Linnunmaa Oy 2017).

107 Soininen and others (n 21); Belinskij and Soininen (n 103). www.ely-keskus.fi/documents/10191/23087670/Selvitys±Suomen±alle±5±MW±vesivoimalaitosten±sek%C3%A4%20niihin±v%C3%A4litt%C3%B6m%C3%A4sti±liittyvien±s%C3%A4%C3%A4nn%C3%B6stelyhankkeiden±vesilain±mukaisten±lupien±kalatalousvelvoitteista.pdf/ accessed 11 November 2020.

108 Water Act of Finland (587/2011) ch 19 s 10.

109 Water Act of Finland ch 3 s 22.

110 Water Act of Finland ch 3 s 21; ch 2 s 7.

111 Soininen and others (n 21); K Haataja, *Vesioikeus I* (Suomalainen Lakimiesyhdistys 1951); Niko Soininen, *Vesioikeudellinen perusteluvelvollisuus. Tutkimus intressivertailuperustelujen oikeudellisista edellytyksistä* (Suomalainen Lakimiesyhdistys 2016); Belinskij and Soininen (n 103).

112 Soininen and others (n 21); Hepola (n 193); Belinskij and Soininen (n 103).

affecting fish migration and the development of other sectors of blue economy, such as fishing tourism. Consequently, the role of hydropower in Finland is controversial. While large- and medium-sized projects form an important part of the blue renewables energy portfolio, and from a climate mitigation perspective rightly enjoy legal protection, there is a need to increase the legal adaptive capacity for re-evaluating small-scale hydropower generation.

5. Conclusions

Energy systems in general, and electricity systems in particular, are slowly starting to transition to renewables. For the first time in Finnish history, onshore wind power generation has become economically viable without financial support from the government.[113] Still, a systemic energy transition from fossil fuels to renewables is far from being completed, and the energy system continues to co-evolve with technological innovation and societal development.

In accordance with the basic argument of sustainable transition research,[114] the law governing energy systems faces two challenges. First, it should have sufficient transformative capacity to trigger change towards increasing renewable energy production while valuing other societal interests. Triggering change is the explicit task of support schemes, whereas the role of direct legal regulation is mostly to safeguard other environmental and societal values. Still, rigid direct regulation protecting environmental values may place obstacles in the way of a desirable transition. Second, the law governing energy systems should have sufficient adaptive capacity to allow past management decisions to be changed in new circumstances if the social and ecological burden of the past decisions starts mounting up. An important aspect of legal adaptive capacity is how the law balances between predictability and permanence on one hand, and flexibility on the other.

The transformative and adaptive capacities of law play out differently in the context of renewable technologies in Finland. As regards offshore wind power, the technology is starting to pick up speed, and based on the EU and Finnish climate mitigation policies, law should support the development and rapid employment of the technology. With regard to hydropower, the situation is different. Most rivers have already been dammed and the question turns to whether the existing legal protection allows the electricity system to adapt to a new reality in which small-scale hydropower especially is causing excessive biodiversity trade-offs.

Exploring the two blue renewable technologies and their respective regulation in the EU and in Finland has shed light on the complexity of transforming sustainable blue renewable energy production and adapting it to new circumstances, and the different roles of law in the process. In both cases, law is pushing for

113 Tuulivoiman rakentaminen ilman tukia (Constructing Wind Power without Financial Support) https://tuulivoimayhdistys.fi/tietoa-tuulivoimasta-2/tietopankki/tuulivoiman-rakentaminen-ilman-tukia accessed 28 December 2020.

114 Roger Hildingsson and Bengt Johansson, 'Governing Low-Carbon Energy Transitions in Sustainable Ways: Potential Synergies and Conflicts between Climate and Environmental Policy Objectives' (2016) 88 Energy Policy 245.

transformation and adaptation, while setting a variety of challenges for realising these aspirations.

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